of the vein fillings may have been aided by hydrothermal emanations associated with the syenite.

RESULTS OF PETROFABRIC ANALYSIS BY AN X-RAY UNIVERSAL STAGE

P. PAULITSCH
Mineralogisches Institut der Technischen Hochschule, Darmstadt, Germany

The paper describes a new instrument, i.e. an X-ray universal stage. Results on the following are given: the preferred orientation of ore minerals such as hematite and garnet, the position of the prism of quartzmaxima in different rocks, of the prism participating on the ellipsoid of *sand* quartz grains, the bending axes in undulatory quartz, and the *fracture* and gliding planes of quartz depending on various paragenesis.

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MERISMITIC DIOPSIDE-MICROCLINE-HORNBLENDE ROCK IN NORTHEASTERN BRAZIL

A. B. RAO
School of Geology and Institute of Earth Sciences, Recife, Brazil

Bands of merismitic diopside rock about one metre thick are located at two localities one along the road section of Uauã-Bendegó in Bahia State, and another along the Floresta-Belem do São Francisco highway in Pernambuco State. They are interesting in that they show large masses of diopside crystals (15 × 12 cm) in a microcline matrix and in places show formation of hornblende either as dark masses or as acicular crystal aggregates. The rock has a patchy appearance and is thus called merismitic in character.

Associated in this region are calc-silicate rocks (skarns and tactites) which do not show contact relations with this rock. Optical and petrographical studies have been made. It is considered that this rock may be classified as diopside hornfels (restrictions are made for its inclusion in the skarn rocks) pertaining to the pyroxene hornfels facies.

A STRUCTURAL CONCEPT OF BORBOREMA PEGMATITE, NORTH EASTERN BRAZIL

A. B. RAO
School of Geology and Institute of Earth Sciences, Recife, Brazil

J. DA CUNHA E SILVA
Sudene, Recife, Brazil

In 1944–45, W. D. Johnston, Jr., classified Borborema pegmaites of Rio Grande do Norte and Paraiba States as homogeneous, mixed, and heterogeneous types. In the heterogeneous type he distinguished four zones, with quartz as nucleus.

Observations made by the authors from south to north across the Borborema province proved: (1) in the southern part of the province mineralized pegmatites are rare; (2) zoned pegmatites are very typical in the southern part of the province but grade gradually northward into the homogeneous type; (3) the gentle pitch of the Borborema geosyncline suggests, in the northern part, the possible presence of pegmatites which have not been adequately exposed due to insufficient erosion; the exposed parts are homogeneous and few of them show indications of mineralization and partial zoning; (4) the general structures of the pegmatites are extremely variable, with bifurcations, lenticular forms, bulging, and tapering. With the indications mentioned above, an idealized structure for the pegmatite in this area is proposed.

When visualized longitudinally, the pegmatite is expected to show bulging in the central portion. This bulged part is zoned and often well mineralized. The tapering at the upper and lower portions is represented by the continuation in the outer zone of the heterogeneous type, which is homogeneous in aspect. The level of erosion in the southern part of the province has exposed the bulged central portion towards its lower

part, or the heterogeneous type. In the northern part of the province the level of erosion has not attained sufficient depth to expose the zoned portion of the pegmatite, resulting in outcrops only of the homogeneous part. This is suggested by study of the dispersion aureoles and is promising for future mining in the area.

STUDIES OF MICAS FROM UNCOMMON ROCKS. I. MICAS FROM NEPHELINE SYENITE, BLUE MOUNTAIN, ONTARIO, AND FROM CARBONATITE, OKA, QUEBEC

J. RIMSAITE
Geological Survey of Canada, Ottawa, Ontario

Chemical compositions and paragenetic studies of micas from the Blue Mountain nepheline deposit indicate at least five periods of crystallization of micaceous minerals:

1. *Brown biotite*: $(K_{1.9}Na_{.07})(Al_{.86}Ti_{.24}Fe_{.42}'''Fe_{2.14}''Mg_{2.02}Mn_{.08}Li_{.08})(Si_{5.2}Al_{2.8})O_{20}(OH_{2.99}F_{.27}Cl_{.18}O_{.28})$ resembles in chemical composition biotites of the surrounding paragneisses. It contains more manganese and titanium, and appears to be older than other micas from the nepheline synenite. It is succeeded by
2. *Coarse-grained muscovite*: with brown bands along the (001) fractures; and
3. *Bright-green biotite*: $(K_{1.91}Na_{.08})(Al_{.54}Ti_{.15}Fe_{1.02}'''Fe_{2.54}''Mg_{1.07}Mn_{.09}Li_{.09})(Si_{5.27}Al_{2.73})O_{20}(OH_{2.42}F_{.32}Cl_{.06}O_{.60})$. The green biotite replaces the brown mica along the fractures. It contains a relatively high ratio of ferric iron to ferrous iron and apparently crystallizes in an alkalic environment.
4. *Medium-fine-grained muscovite* with fine-grained cancrinite replace nepheline along the fractures, and are post-nepheline.
5. *Very-fine-grained "hydronephelite"*: a mixture of muscovite and analcite, is a hydrothermal or diagenetic alteration product of nepheline; it also replaces feldspars and coarse micaceous minerals. The "hydronephelite" contains relatively high strontium (777 ppm) and very little iron (0.4%).

The iron-rich biotite oxidizes on weathering to orange-yellow mica that contains a high ratio of ferric iron to ferrous iron: $(K_{1.34}Na_{.08}Ca_{.08})(Al_{.37}Ti_{.13}Fe_{2.94}'''Fe_{.38}''Mg_{1.2}Mn_{.07})(Si_{5.05}Al_{2.95})O_{19.34}(OH_{4.99}F_{.30})$, and finally alters to vermiculite.

The biotite from the Oka carbonatite is zoned, thus resembling zoned biotites from alkali lamprophyres. However, the succession of the mica zones is different; in micas from alkali lamprophyres the outermost band adjacent to feldspathic groundmass is enriched in iron, whereas in micas from the carbonatite, the outermost band adjacent to carbonate groundmass is pale beige (poor in iron). Electron probe microanalysis of the zoned micas indicated two- to five-fold variations in concentrations of Al, Fe, Mg and Ti while Si and K remained fairly constant. The zoned mica reflects changing physico-chemical conditions during crystallization of carbonatite.

This study presents two examples of the stability of micas: (1) the zoned mica with earlier-formed zones retaining their chemical composition during crystallization of successive zones in a calcic environment, and (2) the unstable brown mica which is being replaced by green mica under apparently alkalic conditions.

TEMPERATURE AND SALINITY OF THE ORE-FORMING FLUIDS AT PINE POINT, NORTHWEST TERRITORIES, CANADA, FROM FLUID INCLUSION STUDIES

E. ROEDDER
United States Geological Survey, Washington, D.C.

Although much of the Pine Point ore does not contain usable fluid inclusions, some sphalerite crystals from vugs and "colloform" crusts were found to contain rare, primary, liquid-gas inclusions adequate for study. These had freezing temperatures ranging